

FIG. 1

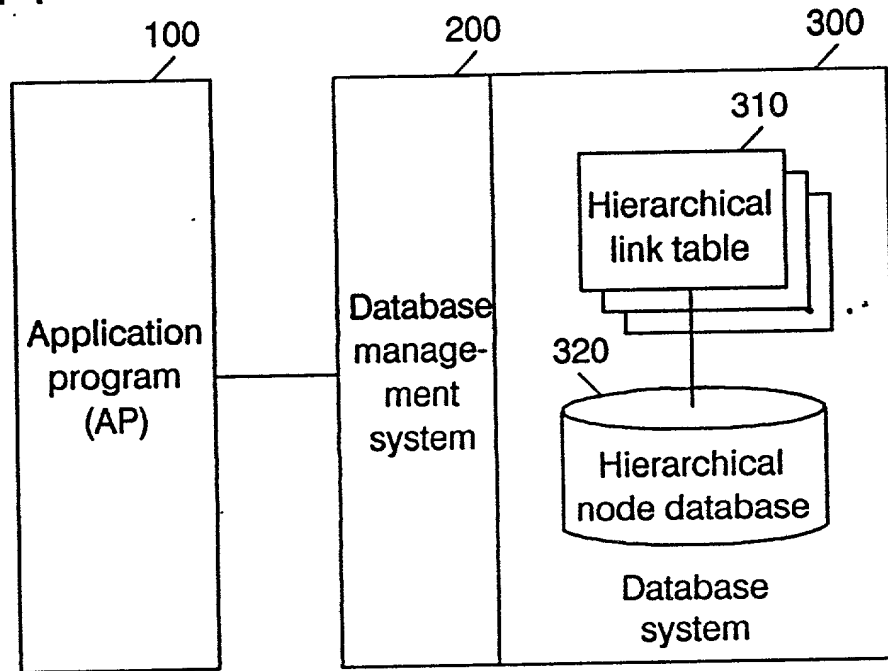


FIG. 2

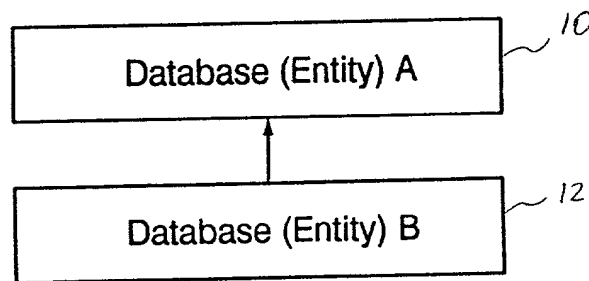


FIG. 3

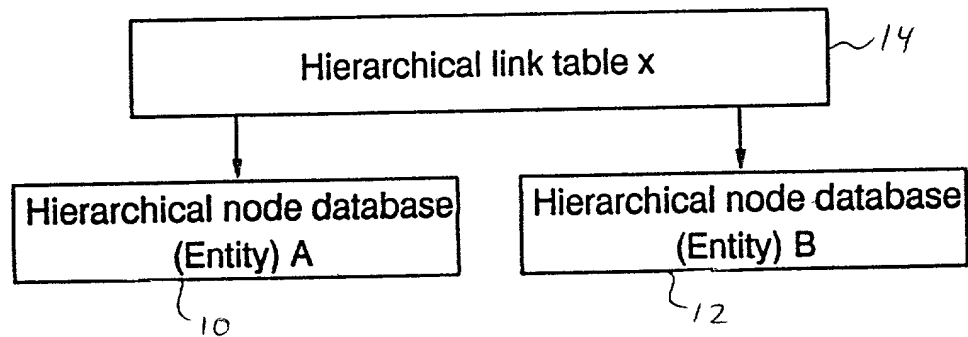
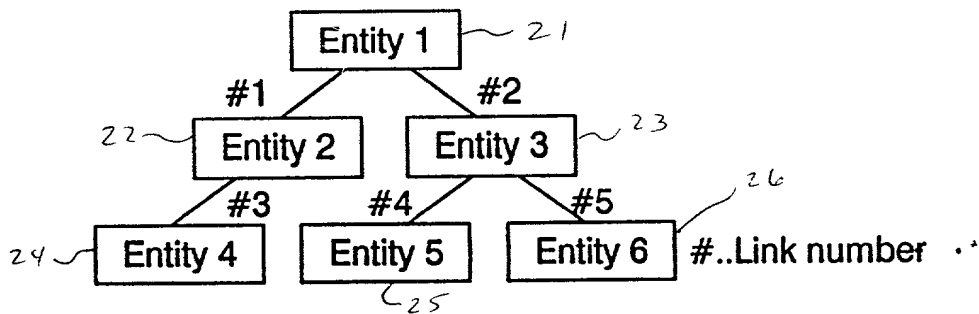


FIG. 4

Database relationship viewed from a specific application program



Conventional data storage method

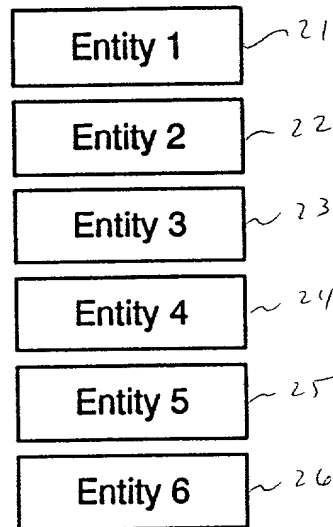
1		Attribute
2	Parent = entity 1	Attribute
3	Parent = entity 1	Attribute
4	Parent = entity 2	Attribute
5	Parent = entity 3	Attribute
6	Parent = entity 3	Attribute

Data storage method using hierarchical link table

<u>Hierarchical node database</u>		<u>Hierarchical link table</u>	
1	Attribute	1	Parent = entity 1 Child = entity 2
2	Attribute	2	Parent = entity 1 Child = entity 3
3	Attribute	3	Parent = entity 2 Child = entity 4
4	Attribute	4	Parent = entity 3 Child = entity 5
5	Attribute	5	Parent = entity 3 Child = entity 6
6	Attribute		

FIG. 5

Entities required for application



Hierarchical node database

50

Node ID	Node attribute
100	Entity ID = 1, Name = 52
101	Entity ID = 2, Name =
102	Entity ID = 3, Name =
103	Entity ID = 4, Name =
104	Entity ID = 5, Name =
105	Entity ID = 6, Name =

51

Used in common by various applications

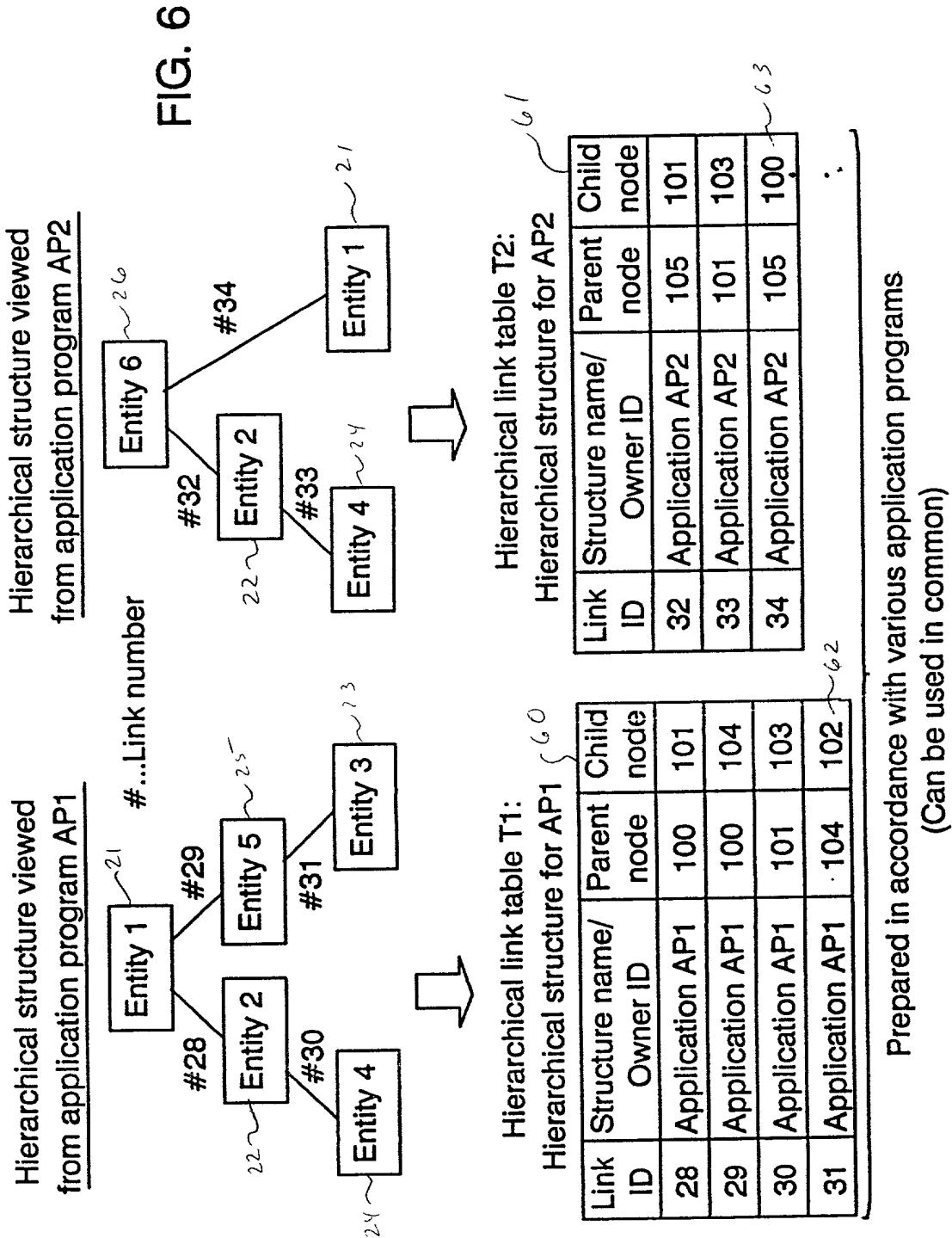


FIG. 7

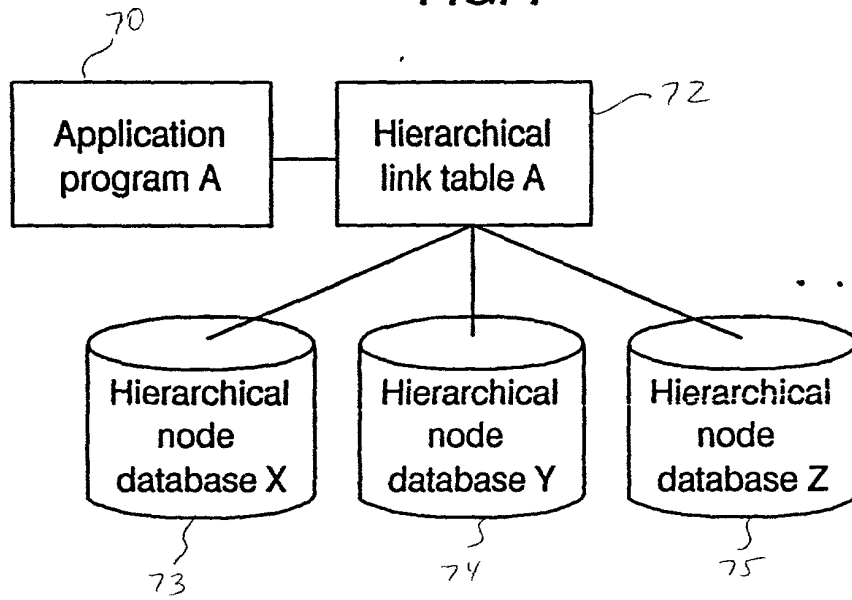
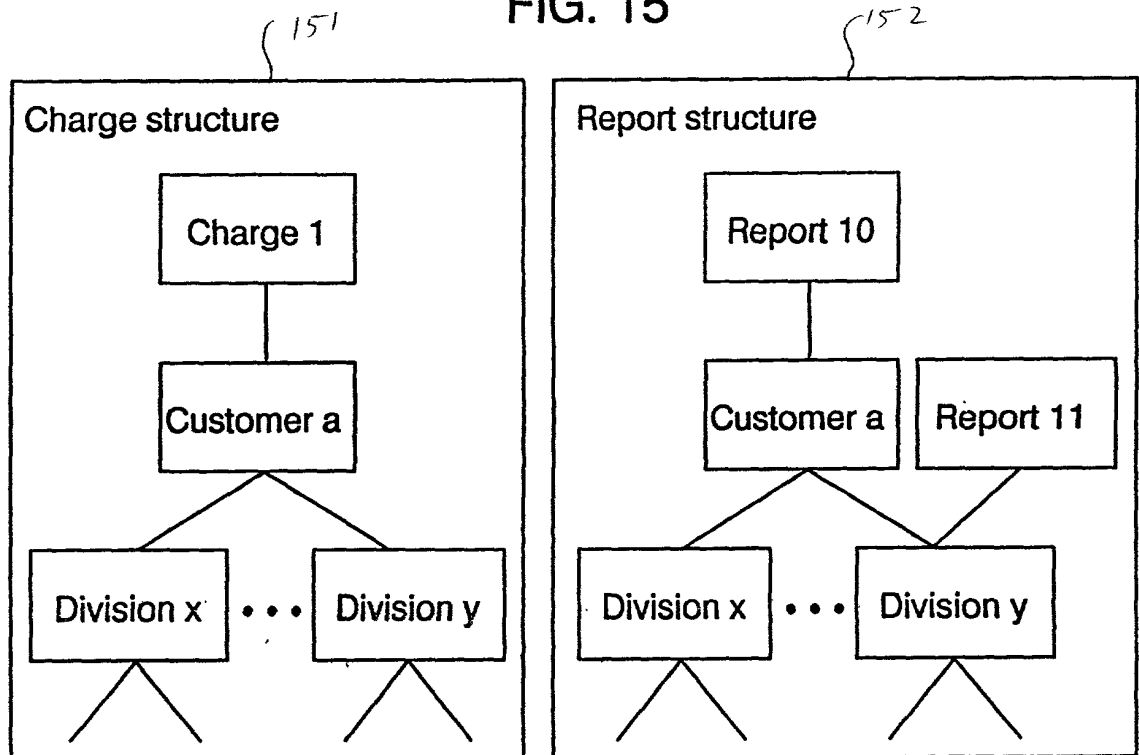
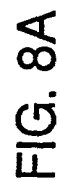


FIG. 15





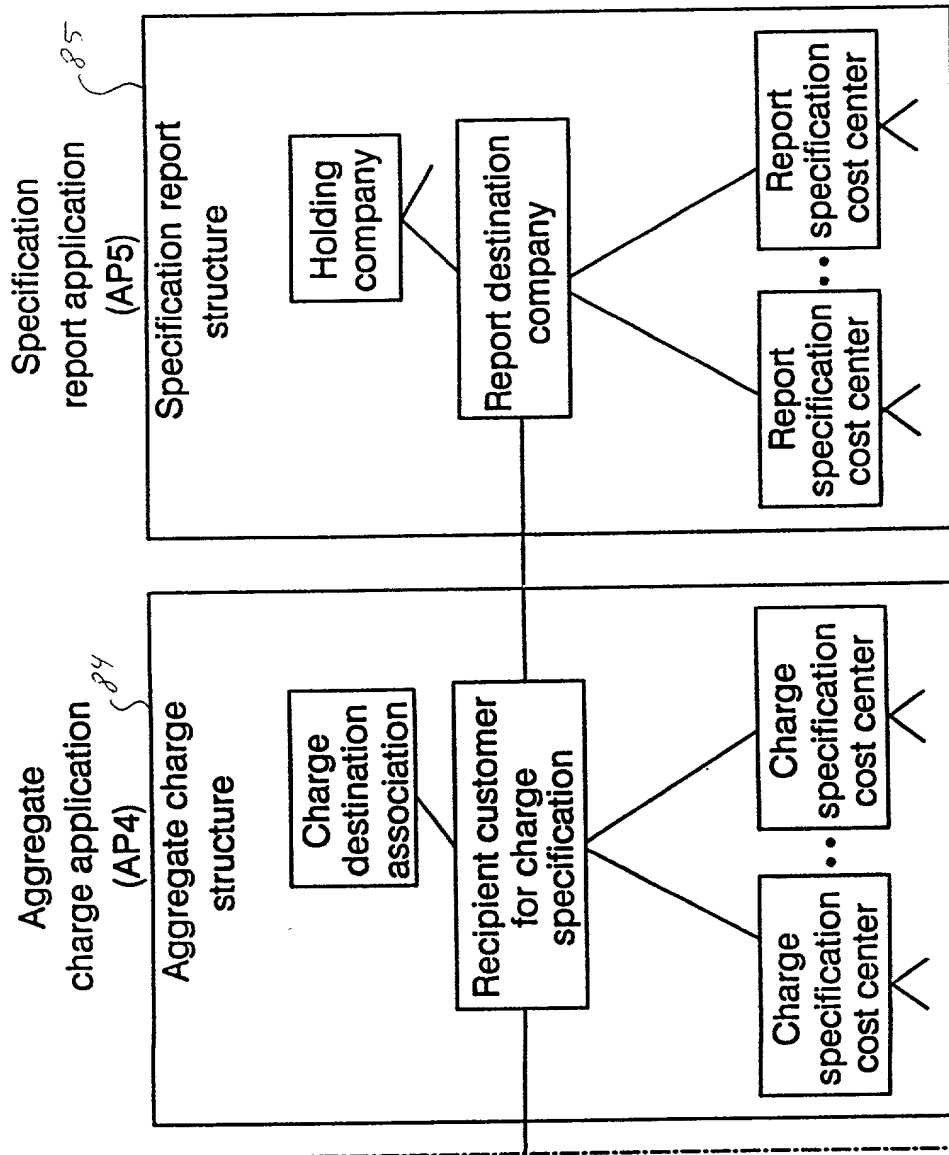


FIG. 8B

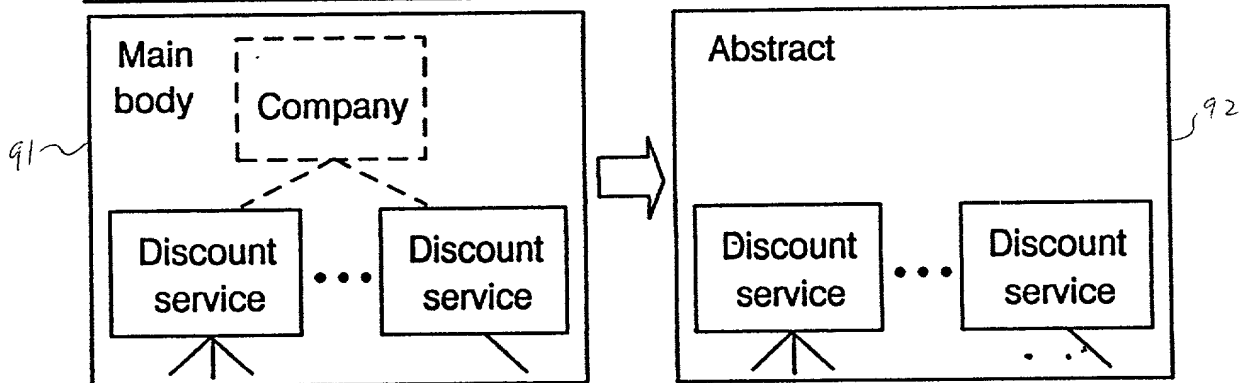
FIG. 8

FIG. 8A

FIG. 8B

FIG. 9

Discount calculation structure for a specific client



Hierarchical node database: Product catalog

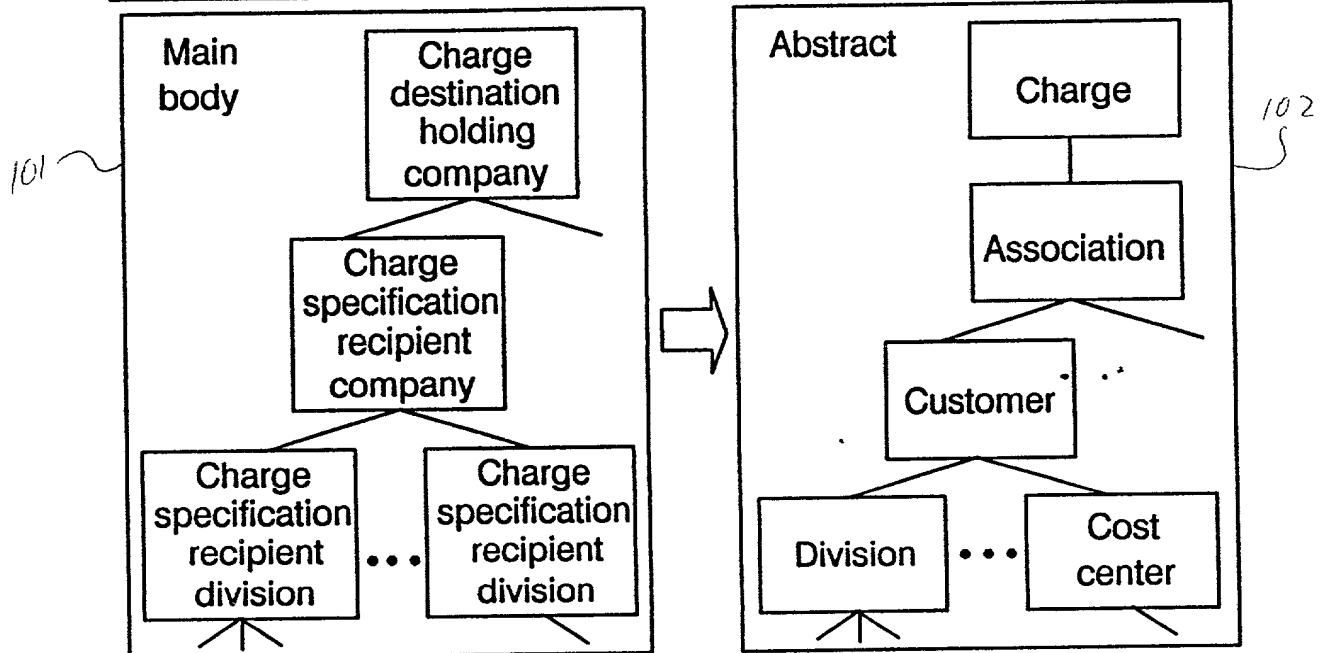
Product ID	Attribute
Product/service 1	Attribute 1
Product/service 2	Attribute 2
Product/service 3	Attribute 3
Product/service 4	Attribute 4
Charge calculation 4	Attribute 4
Discount 5	Attribute 5
Discount 6	Attribute 6

Hierarchical link table: Discount structure 1

Link ID	Owner	Parent node	Child node
Link 1	Discount structure 1	Charge calculation 4	Product/service 1
Link 2	Discount structure 1	Charge calculation 4	Product/service 2
Link 3	Discount structure 1	Charge calculation 4	Product/service 4
Link 4	Discount structure 1	Charge calculation 4	Product/service 3
Link 6	Discount structure 1	Discount 5	Product/service 1
Link 7	Discount structure 1	Discount 5	Product/service 2
Link 8	Discount structure 1	Discount 6	Product/service 1
Link 9	Discount structure 1	Discount 6	Product/service 3
Link 10	Discount structure 1	Discount 6	Product/service 4

Aggregate charge structure for a specific client

FIG. 10



Hierarchical node database:
Organization DB

Organization ID	Attribute
Association 1	Attribute 1
Customer 1	Attribute 1
Division 1	Attribute 1
Division 2	Attribute 2

Hierarchical node database:
Product catalog

Product ID	Attribute
Charge 1	Attribute 1
Product/service 1	Attribute 1
Product/service 2	Attribute 2
Product/service 3	Attribute 3
Product/service 4	Attribute 4

Hierarchical link table: Charge structure 1

Link ID	Owner	Parent node	Child node
Link 1	Discount structure 1	Charge 1	Association 1
Link 2	Discount structure 1	Association 1	Customer 1
Link 3	Discount structure 1	Customer 1	Cost center 1
Link 4	Discount structure 1	Customer 1	Cost center 2
Link 5	Discount structure 1	Association 1	Customer 2

FIG. 11

Example used for hierarchical link table: {///

Link ID	Effective start date	Effective end date	Structure name/ Owner ID	Parent node	Child node
28	1999.1.10		Application AP1	100	101
29	1999.1.10		Application AP1	100	104
30	1999.1.10	1999.3.31	Application AP1	101	103
31	1999.4.1		Application AP1	101	102

Link ID	Effective start date	Effective end date	Structure name/ Owner ID	Parent node	Child node
32	1999.1.10		Application AP2	105	101
33	1999.1.10	1999.3.31	Application AP2	101	103
34	1999.1.10		Application AP2	105	100

Example used for hierarchical node database: {///2

Node ID	Effective start date	Effective end date	Node attribute
100	1999.1.1		Entity ID = 1, Name = ...
101	1999.1.1		Entity ID = 2, Name = ...
102	1999.4.1		Entity ID = 3, Name = ...
103	1999.1.1	1999.3.31	Entity ID = 4, Name = ...
104	1999.1.1		Entity ID = 5, Name = ...
105	1999.1.1		Entity ID = 6, Name = ...

FIG. 12A

(d)

Charge/discount calculation

A case wherein a change occurs during a period

Cycle table

6/20-7/13

Charge calculation period

Company 2

Discount

lanhane

one.

Input 50

change

Link start

date: 7/14-

Link end

date: 7/13

6122

12.4

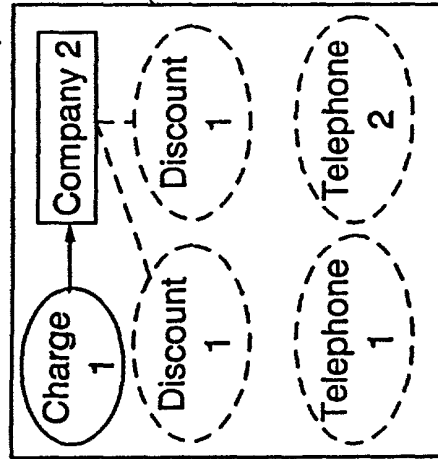
FIG. 12B

(c) Charge fee aggregate

Cycle table

7/26

Charge calculation date
(Execution of calculation)



7/14-7/19

Charge calculation period

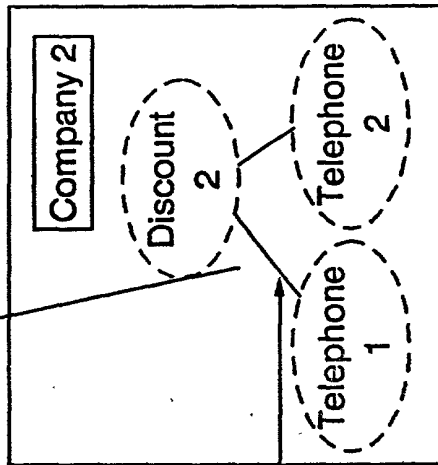


FIG. 13

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Node ID	Effective start date	Effective end date	Node attribute
	1999.1.1	1999.3.31	Type = nearest address, Telephone address ID = ...
	1999.4.1		Type = nearest address, Telephone address ID = ...
	1999.1.1	1999.3.31	Type = cable, Cable ID =, Cable name = ...
	1999.4.1		Type = cable, Cable ID =, Cable name = ...
	1999.1.1		Type = HH, HH - ID =, HH name = ...
	1999.1.1		Type = optical center line, Optical center line No =, Status = vacant
	1999.8.1		Type = ONU, ONU type =, ONU - ID = ...
	1999.8.1		Type = ONU - LC, C slot No = ...
	1999.1.1		Type = N - SLT, SLT - ID = ...
	1999.1.1		Type = OSU, OSU position = ...
	1999.1.1		Type = VCN, VCN position = ...
	1999.1.1		Type = connection terminal, Connection terminal No = ...
	1999.1.1		Type = metal center line, Center line No = ...
	1999.1.1		Type = LXM position, LXM position No = ...
	1999.1.1		Type = DSU, DSU - ID = ...
	1999.1.1		Type = connection terminal, Connection terminal No = ...

FIG. 14A

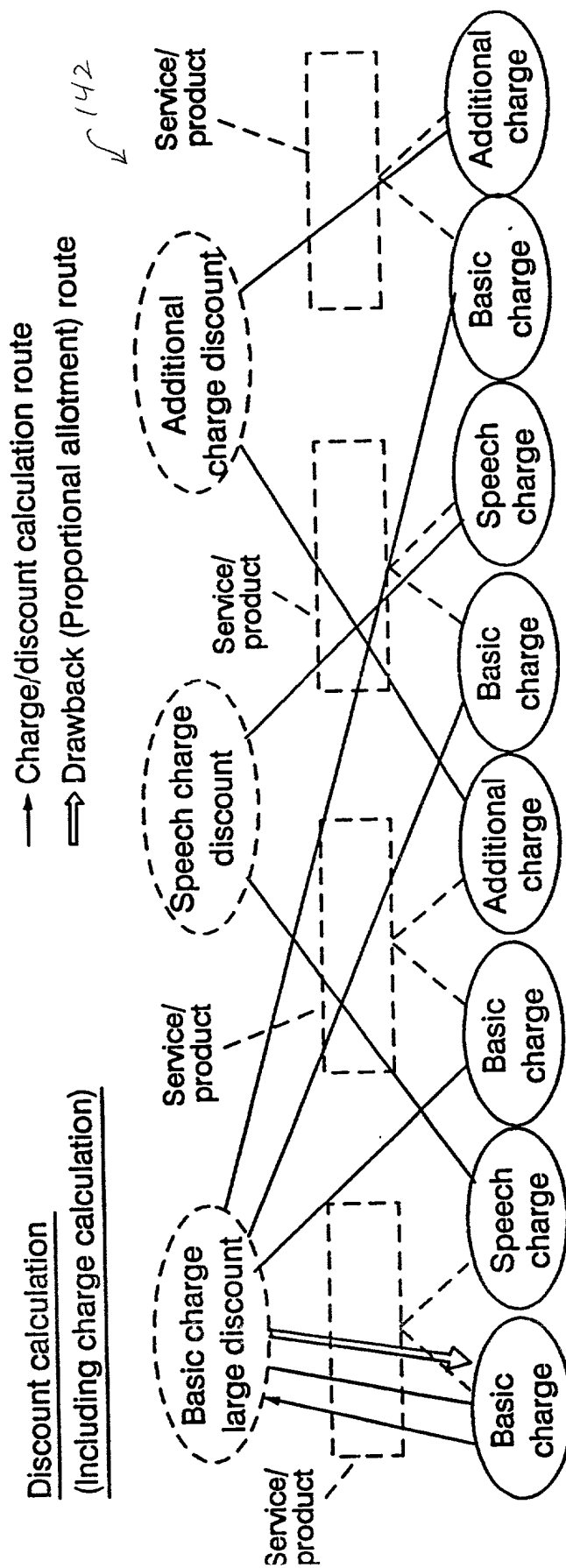


FIG. 14B

